CLAIMS

Having thus described the present invention, what is claimed as new and desired to be secured by Letters Patent is as follows:

1. An overlay mattress having a patient support surface, said overlay mattress including:

a) a cushion layer;

b) a lifting cell layer comprised of a plurality of lifting cells for elevating portions of the overlay mattress;

c) a bottom layer; and

d) an overlay mattress cover.

2. An overlay mattress as in claim 1, said overlay mattress further comprising releasable attaching means for releasably attaching the lifting cells to the bottom layer.

3. An overlay mattress as in claim 1, said overlay mattress further comprising releasable attaching means for releasably attaching the overlay mattress to a support surface.

4. An overlay mattress as in claim 1, said overlay mattress further comprising a thermal layer for controlling the temperature of the patient support surface, said thermal layer being in thermal communication with the patient support surface.

5. An overlay mattress as in claim 4, wherein the thermal layer includes:

a) an electrical heating element, and

b) a heating controller for controlling the temperature of the electrical heating element.

6. An overlay mattress as in claim 4, wherein the overlay mattress further includes a means for regulating the temperature of a thermal fluid, and the thermal layer includes a thermal bladder for containing the thermal fluid.

7. An overlay mattress as in claim 6, wherein the means for regulating the temperature of the thermal fluid includes a means for heating the thermal fluid.

8. An overlay mattress as in claim 6, wherein the means for regulating the temperature of the thermal fluid includes a means for cooling the thermal fluid.

9. An overlay mattress as in claim 6, wherein the means for regulating the temperature of the thermal fluid includes a means for heating the thermal fluid and a means for cooling the thermal fluid.

10. An overlay mattress as in claim 1, said overlay mattress cover including four sides and a plurality of pleats along one or more of said four sides to facilitate expansion.

11. An overlay mattress as in claim 1, said overlay mattress cover including

a) four sides, a patient support surface and a bottom; and

b) a puncture resistant material comprising the patient support surface and at least one of said four sides.

12. An overlay mattress as in claim 1, said overlay mattress cover including a fluid impermeable material.

13. An overlay mattress as in claim 1, said overlay mattress being substantially comprised of radiolucent materials.

14. An overlay mattress as in claim 1, wherein the lifting cells are comprised of fluid inflatable bladders.

15. An overlay mattress as in claim 14, wherein the lifting cells include bellows-like pleats to facilitate expansion.

16. An overlay mattress as in claim 14, wherein the lifting cells include at least one wedge-like inflatable bladder.

17. An overlay mattress as in claim 14, wherein the lifting cell layer includes at least one pair of stacked fluid inflatable bladders.

18. An overlay mattress as in claim 14, further including a reforming means between adjacent fluid inflatable bladders.

19. An overlay mattress as in claim 18, wherein said reforming means is comprised of a foam rubber insert.

20. An overlay mattress as in claim 18, wherein said reforming means includes a plurality of plastic sleeves for constraining the fluid inflatable bladders upon inflation, each of said plastic sleeves having an opening at a top and an opening at a bottom and having a cross-section shape substantially similar to the cross-section shape of the fluid inflatable bladder being constrained.

21. An overlay mattress as in claim 14, further including an inflow line for delivering fluid from a fluid supply source to said bladders.

22. An overlay mattress as in claim 21, further including a fluid distribution system, said fluid distribution system controlling the delivery of fluid to said bladders, and being interposed between said inflow line and said bladders and in fluid communication with said inflow line and said bladders.

23. An overlay mattress as in claim 22, wherein said fluid distribution system includes an inflow valve, a manifold, and a plurality of inlet valves, said inflow valve controlling the delivery of fluid from the fluid supply source to the manifold and being

interposed between and in fluid communication with said inflow line and said manifold, and each of said plurality of inlet valves controlling the delivery of fluid from the manifold to one or more of said bladders and being interposed between and in fluid communication with said manifold and the one or more of said bladders.

24. An overlay mattress as in claim 23, said inlet valves being electronically activated valves.

25. An overlay mattress as in claim 24, said electronically activated valves being piezoelectric valves.

26. An overlay mattress as in claim 24, said electronically activated valves being solenoid valves.

27. An overlay mattress as in claim 24, said fluid distribution system further including an electronic means for controlling the activation of said electronically activated valves.

28. An overlay mattress as in claim 27, said electronic means for controlling the activation of said electronically activated valves including:

a) a programmable logic controller in electronic communication with said electronically activated valves, said programmable logic controller including:

i) means for receiving input signals, said input signals being

representative of said electronically activated valves to open or close, and

ii) means for producing output signals in response to said input signals, said output signals being communicated to said electronically activated valves and activating one or more of said electronically activated valves.

29. An overlay mattress as in claim 28, said electronic means for controlling the activation of said electronically activated valves further including means for a user to provide input signals to said programmable logic controller.

30. An overlay mattress as in claim 29, said means for a user to provide input signals to said programmable logic controller further including means for providing input signals representative of a desired overlay mattress position, said input signals representative of a desired overlay mattress position causing said programmable logic controller to produce output signals in response thereto, said output signals in response thereto being communicated to said electronically activated valves and activating one or more of said electronically activated valves to allow fluid to enter or exit bladders and achieve the desired overlay mattress position. .

31. An overlay mattress as in claim 23, wherein said fluid distribution system further includes an exhaust valve, said exhaust valve being in fluid communication with said maniflod and allowing fluid to escape from said manifold when said exhaust valve is

opened. .

32. An overlay mattress as in claim 1, said overlay mattress further including a layer of compartments for receiving X-ray cassettes.

33. An overlay mattress as in claim 1, said overlay mattress further including a pillow.

34. An overlay mattress as in claim 33, said pillow being comprised of an inflatable bladder.

35. An overlay mattress as in claim 33, said pillow being comprised of an inflatable bladder having a generally horseshoe shape, said inflatable bladder being capable of supporting and elevating a patient's head in a face-down position, when said inflatable bladder is inflated, without obstructing the patient's breathing.

36. An overlay mattress as in claim 1, said overlay mattress further including a pressure shifting layer.

37. An overlay mattress as in claim 36, said pressure shifting layer including a plurality of fluid inflatable bladders and means for supplying a fluid from a fluid supply source.

38. An overlay mattress as in claim 37, said means for supplying a fluid including means for controlling the amount of fluid in each of said plurality of fluid inflatable bladders.

39. An overlay mattress as in claim 38, said means for controlling the amount of fluid including pressure sensor means for determining a fluid pressure in each of said plurality of fluid inflatable bladders.

40. An overlay mattress as in claim 39, said means for controlling the amount of fluid further including means for controlling the amount of fluid to achieve:

a) a first fluid pressure at a first time and a second fluid pressure at a second time in at least one of said plurality of fluid inflatable bladders, and

b) the second fluid pressure at the first time and the first fluid pressure at the second time in at least one other of said plurality of fluid inflatable bladders.

41. An overlay mattress as in claim 39, said means for controlling the amount of fluid further including means for controlling the amount of fluid to cycle between a first fluid pressure and a second fluid pressure at a determined frequency in at least one of said plurality of fluid inflatable bladders, and to cycle between the second pressure and the first fluid pressure at the determined frequency in at least one other of said plurality of fluid bladders.

42. A modular overlay mattress having a patient support surface, said overlay mattress including:

a) a removable cushion layer;

b) a removable lifting cell layer comprised of a plurality of removable lifting cells for elevating portions of the overlay mattress;

c) a removable bottom layer; and

d) a removable overlay mattress cover.

43. A modular overlay mattress as in claim 42, said modular overlay mattress further comprising a removable thermal layer for controlling the temperature of the patient support surface.

44. A modular overlay mattress as in claim 43, further including removable inserts for replacing said lifting cells removed from the modular overlay mattress.

45. A modular overlay mattress as in claim 44, said removable inserts being comprised of foam rubber.

46. A modular overlay mattress as in claim 42, said modular overlay mattress further comprising a removable pressure shifting layer.

47. A method for positioning a patient, said method comprising steps of:

a) laying a patient on the patient support surface of an overlay mattress

according to claim 14, and

b) causing one or more of said inflatable bladders to inflate, thereby elevating one or more portions of said overlay mattress, said one or more portions being proximate to said inflated bladders.

48. A method for regulating the temperature of a patient, said method comprising steps of:

a) laying a patient on the patient support surface of an overlay mattress according to claim 4, and

b) regulating the temperature of the thermal layer to cause the patient support surface to achieve an approximate desired temperature.

49. A method for reducing the risk of bedsore formation, said method comprising steps of:

a) laying a patient on the patient support surface of an overlay mattress according to claim 41, and

b) cycling at least one of said plurality of fluid inflatable bladders in the vicinity of an area of the patient's body susceptible to bedsore formation between a first fluid pressure and a second fluid pressure at a determined frequency, and

c) cycling at least one other of said plurality of fluid inflatable bladders in the vicinity of an area of the patient's body susceptible to bedsore formation between the second fluid pressure and the first fluid pressure at the

12 determined frequency.